NRC·CNRC
Institute for Research in Construction

Volume 13 Number 3 **September 2008**

construction innovation

NRC-IRC launches initiative to improve air quality

In Canada, much of what we do in a day takes place indoors—at home, at the office, inside schools, theatres, shopping malls, restaurants and other enclosed spaces. In most buildings, the quality of the air we breathe depends on mechanical systems that are designed to ventilate and dilute pollutants in accordance with established engineering principles.

Increasingly, concerns are being raised about the effectiveness of these methods to provide acceptable indoor air quality. There are also large gaps in our knowledge about the correlation between indoor air quality and the health of occupants. (See sidebar on indoor air quality, page 10).

In a bid to address these important issues on behalf of all Canadians, NRC-IRC has taken the lead in a comprehensive initiative that will begin to fill the gaps in our knowledge, tap into the collective wisdom of people in the health and building community, and pave the way for reliable and effective best practices and evaluation protocols for air quality-related devices.

The NRC-IRC Indoor Air Initiative, which is part of the Government of Canada's Clean Air Agenda for both outdoor and indoor air, takes a multi-faceted approach to the issue of indoor air quality, combining research, technology assessment and a national forum for discussion and dissemination of information.

The new indoor air research facility currently being built as part of the NRC-IRC Indoor Air Initiative

The Clean Air Agenda initiatives to address the issue of indoor air were developed in collaboration with Health Canada.

The initiative is being launched with a uniquely designed field study that will be carried out in about 100 homes occupied by families with asthmatic children in the Quebec City area. Partnering with the Institut national de santé publique du Québec (INSPQ) and other federal partners, NRC-IRC researchers will assess the physical characteristics of the homes and the quality of their indoor air, while medical professionals from INSPQ will assess the health of the children.

Over a three-year period following the initial assessment, modifications will be made to the ventilation and air-distribution systems in the homes to improve indoor air quality, and a follow-up assessment will be conducted to measure and evaluate whether there have been any changes in the indoor air quality or the health of the children. It is expected that the results from this study will improve our understanding of the impact of ventilation and air distribution on indoor air quality.

Meanwhile, to optimize the design of modifications to the homes, the impact of different

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Read *Construction Innovation* on the Web at **http://irc.nrc-cnrc.gc.ca/ci**

National Research Council Canada | Conseil national de recherches Canada

Canada

The national construction codes need your input

The Canadian Commission on Building and Fire Codes (CCBFC) invites all Canadians to take part in its annual fall public review of proposed changes to the national construction codes. The public review is one of the main steps in the process for developing national code documents, providing a nation-wide forum where anyone can review and comment on the changes proposed.

The Fall 2008 public review will include the majority of the changes proposed for the 2010 edition of the Codes and will run from September 29, 2008 until November 28, 2008, using the National Codes Web site www.nationalcodes.ca as in previous public reviews.

The national construction codes developed by the CCBFC—National Building Code (NBC), National Fire Code (NFC) and the National Plumbing Code (NPC)—are model codes, which the provinces and territories can adopt as is or with modifications as part of their building, fire and plumbing regulations. The national code development system is a partnership between provinces and territories and the National Research Council.

There will be approximately 600 proposed technical changes for the 2010 edition of the national construction codes. These technical changes have been proposed by the various standing committees of the CCBFC responsible for the three codes to update or remove outdated material and to add new provisions in several subject areas.

The changes listed below are just some of the topics covered by the proposed changes to the codes:

NBC

- **Residential Care Occupancy (Part 3 and Part 9)**
  Residential Care premises generally require more fire and structural safety features than those of a typical residential occupancy (i.e., Group C occupancy), but do not generally require these features to be as extensive as those of institutional occupancies, such as hospitals or nursing homes (i.e., Group B occupancy). There is a growing concern that the current code requirements applying to residential care occupancies are too rigorous in some areas and not rigorous enough in others. The joint Task Group of the Standing Committees on Use and Egress (lead), Fire Protection and Housing and Small Buildings presented several recommendations to their respective committees, many of which have been accepted for public review.

  The proposals can be summarized as follows: a relaxation of the requirements for smaller care occupancies that have a limited number of occupants requiring care or treatment. In addition, depending on the nature of these clearly identified occupancies, the proposals introduce new construction, sprinklering, emergency power and fire alarm requirements.

- **Spatial Separation between Buildings (Part 3 and Part 9)**
  A task group was mandated to evaluate the current requirements for spatial separation between buildings of combustible construction and to recommend revisions if needed.

  Four sets of proposed changes have been developed to address the following: the relationship between fire service response time and limiting distance between buildings; cladding and sheathing materials used in wall construction; distribution of openings; and protection of soffits.

- **Secondary Suites (Part 9)**
  The Standing Committee on Housing and Small Buildings, the Standing Committee on Use and Egress and the Standing Committee on Fire Protection formed a joint task group to evaluate the requirements that currently apply to buildings with not more than two dwelling units and recommended revisions to address secondary suites.

  Secondary suites are smaller suites and often retrofitted into existing single-family dwellings. These are sometimes referred to as accessory apartments or "in-law suites."

- **Lateral Loads (Part 9)**
  The Standing Committee on Housing and Small Buildings created a task group to examine requirements in Part 9 of the NBC regarding lateral loads.

  The joint task group investigated various factors related to this issue including high seismic and wind load regions and anchorage and bracing.

NFC

- **Leak Detection and Monitoring**
  The Standing Committee on Hazardous Materials and Activities accepted for public review several proposed changes related to the detection and monitoring of storage tanks, sumps, and piping systems containing flammable and combustible liquids. In light of rapidly changing technologies in this area, the standing committee has proposed several changes dealing with the method of leak detection, monitoring and handling of certain dangerous goods.

- **Storage of Flammable and Combustible Liquids in Buildings**
  The standing committee also proposed many changes to better protect the storage of flammable and combustible liquids within buildings by limiting the quantity of product and introducing new passive and active fire protection measures.

NPC

- **Water Pipe Sizing**
  The pipe sizing information in the NPC was in need of a review and an update. A task group was formed to review new materials and technologies and to determine if changes were needed. The information in the NPC needed to be updated since the use of water conserving appliances and fixtures is being implemented in buildings and facilities. This results in a lower water usage, which has an impact on the water pipes delivering water to the building and/or facility.

  Based on the recommendations of the task group, the Standing Committee on Building and Plumbing Services accepted for public review a number of proposed changes to Sections 2.6. and 2.7. as well as to the Appendix of the NPC 2005.

You are invited to participate in the annual fall public review and to submit your comments by visiting the National Codes Web site at www.nationalcodes.ca. All comments submitted are reviewed and addressed by the relevant standing committees.

For more information on the CCBFC and on the national code development process, please visit http://www.nationalcodes.ca/ccbfc/index_e.shtml, or contact the Secretary to the CCBFC at (613) 993-5569, fax (613) 952-4040, or e-mail codes@nrc-cnrc.gc.ca.

Second Series of Revisions and Errata to 2005 National Construction Codes Now Available!

The second series of revisions and errata have been issued for the following 2005 national construction code documents:

- National Building Code of Canada 2005;
- National Fire Code of Canada 2005;
- National Plumbing Code of Canada 2005;
- User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

Revisions are issued between code cycles to promptly address health- or safety-related matters, among others, and are approved by the Canadian Commission on Building and Fire Codes. Errata are corrections that facilitate the use of code documents. Code users should contact their local authority having jurisdiction to find out if these revisions and errata apply in their province or territory.

The second series of revisions and errata have been added to the tables prepared for the first series of revisions and errata released in December 2007 to form a comprehensive document. They are identified in the "Date of Issue" column with the date "08-06-20." The tables along with selected replacement pages can be viewed, downloaded and printed from the Internet at http://irc.nrc-cnrc.gc.ca/pubs/codes/revisions_e.html. The replacement pages are identified in the footer with "(Updated page 08-06-20)."

Clients who purchased a publication on CD-ROM will receive instructions by fax on the procedure to follow to update their electronic documents with the second series of revisions and errata.

For further information, please contact NRC-IRC's Publication Sales Department:

Tel.: 1-613-993-2463 or 1-800-672-7990
Fax: 1-613-952-7673
E-mail: IRCpubsales@nrc-cnrc.gc.ca

Codes upcoming events

Fall 2008

CCBFC standing committee meetings. Please consult the Canadian Codes Centre Web site at http://www.nationalcodes.ca/ncd_calendar_e.shtml or contact Anne Gribbon at 613-993-5569; e-mail: anne.gribbon@nrc-cnrc.gc.ca

February 22-23, 2009

Meeting of the Canadian Commission on Building and Fire Codes. Halifax.

Contact:
Anne Gribbon at 613-993-5569;
e-mail: anne.gribbon@nrc-cnrc.gc.ca

Construction innovation
Publications Mail Agreement No. 40062591

Return Undeliverable Canadian Addresses to:

Institute for Research in Construction
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E-mail: IRCpubsales@nrc-cnrc.gc.ca
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Call for volunteers for membership on standing committees for the NBC, NFC and NPC

The term for the current standing committees will be expiring shortly. The Canadian Commission on Building and Fire Codes (CCBFC) is issuing a call for volunteers to serve on its standing committees. Anyone interested in participating in one of the committees is encouraged to submit their application.

New appointments and re-appointments will be effective June 1, 2009.

The CCBFC is responsible for the development of the national model construction codes of Canada. It oversees the work of a number of standing committees, whose members apply their experience in various technical areas of the codes to develop and improve them, in order to help protect the health and safety of Canadians. These areas include:

- Fire Protection (NBC Part 3 and NFC Part 2 and 6)
- Use and Egress (NBC Part 3 and NFC Part 2)
- Building and Plumbing Services (NBC Parts 6 and 7 and NPC)
- Structural Design (NBC Part 4)
- Houses and Small Buildings (NBC Part 9)
- Environmental Separation (NBC Part 5)
- Hazardous Materials and Activities (NFC)

Committee members, selected for their expertise, commit to a five-year term. Members may be re-appointed for further terms subject to maintaining a reasonable degree of membership rotation. The membership of the committee has representation from the industry, the regulatory, and the general interest sectors and is balanced by geographic region. Such appointments do not carry remuneration; however, expenses incurred in attending meetings are reimbursed by NRC.

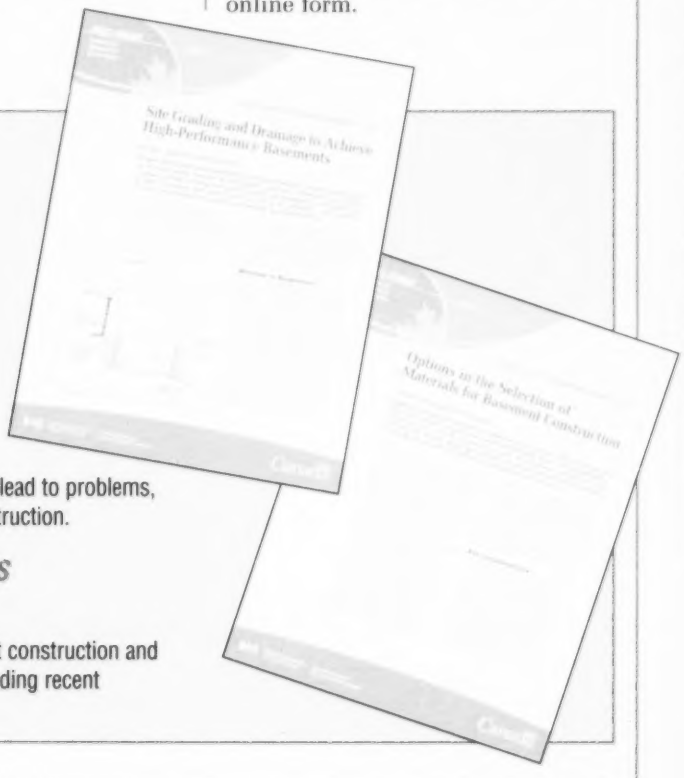
For more information on the CCBFC standing committees, please refer to: http://www.nationalcodes.ca/ccbfc/committee_e.shtml.

If you are interested in becoming a member and participating in important national code development work, please send an expression of interest to the Secretary of the CCBFC using our online form, which can be found at www.nationalcodes.ca, before **February 27, 2009**. Please indicate which standing committee(s) you are interested in joining along with a 120-word summary of your relevant experience.

If you are not available, but know of someone who in your judgment would make a good member, please encourage them to provide an expression of interest via the online form.

Two new Construction Technology Updates

are now available at http://irc.nrc-cnrc.gc.ca/ctus


Site Grading and Drainage to Achieve High-Performance Basements
Options in the Selection of Materials for Basement Construction

No. 69. Site Grading and Drainage to Achieve High-Performance Basements

This Update reviews current construction practices used for basements, discusses some of the main issues and deficiencies that can lead to problems, and provides practical suggestions for improving drainage and construction.

No. 70. Options in the Selection of Materials for Basement Construction

This Update discusses some of the key materials issues in basement construction and reviews the options regarding available materials and methods, including recent developments that enhance performance and efficiency.

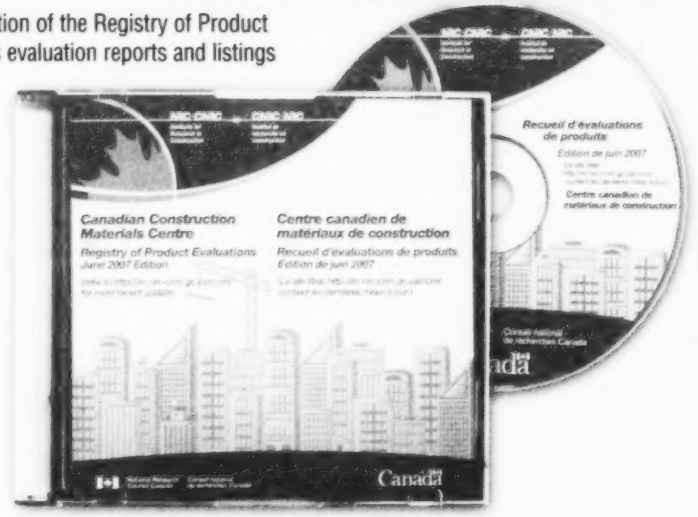
CCMC

2008 Edition of Registry of Product Evaluations now available!

CCMC is pleased to announce the release of the 2008 edition of the Registry of Product Evaluations. The Registry of Product Evaluations contains evaluation reports and listings for over 500 products evaluated by CCMC. The documents can easily be found according to report or listing number, manufacturer's name, product name, or MasterFormat division number.

The Registry of Product Evaluations is available free of charge on CD-ROM. The official version of CCMC's Registry of Product Evaluations, which is updated quarterly, can also be viewed free of charge on the Web at **http://irc.nrc-cnrc.gc.ca/ccmc/index_e.html**.

To order the 2008 edition of the Registry of Product Evaluations, please visit the NRC's Virtual Store at **www.nrc-cnrc.gc.ca/virtualstore** or contact NRC-IRC's Publication Sales Department at 1-800-672-7990 or 1-613-993-2463 (Ottawa-Gatineau and U.S.).


Canadian Construction Materials Centre
Registry of Product Evaluations
June 2007 Edition
Centre canadien de matériaux de construction
Recueil d'évaluations de produits
Edition de juin 2007
Recueil d'évaluations de produits
Centre canadien de matériaux de construction
Canada

New product evaluations

Company	Product Name	CCMC #	Description
Guardian Fiberglass Inc.	Ultra-Fit DS/Asure-R	13315R	Spray-applied, mineral/cellulose fibre insulation in walls with netting
Truefoam Limited	EPS Type 3	13317L	Expanded polystyrene insulation board
Applegate Wisconsin LLC	Applegate Stabilized Cellulose Type II Insulation	13318L	Cellulose fibre insulation
Louisiana-Pacific Corporation	LP Solidstart Strand Lumber	13319R	Structural composite lumber
Georgia-Pacific Chemicals LLC	GP 6770 Series of Resins	13321L	Structural wood adhesives
Georgia-Pacific Chemicals LLC	GP 5770 Series of Resins	13322L	Structural wood adhesives
Roseburg Forest Products Co.	RFPI®-Joist	13323R	I-joists

For further information on the performance, usage and limitations of these products, as well as for other reports and listings by CCMC, see the Web Registry of Product Evaluations located at **http://irc.nrc-cnrc.gc.ca/ccmc/regprodeval_e.html**.

Building Science Insight now on the Web

NRC-IRC is pleased to announce that Webcasts of our two most recent BSI seminars, BSI 2006 on **Sustainable Infrastructure** and BSI 2007 on **Fire Safety Research for Better Building Design**, are now available. These consist of complete audio and visual records of each presentation, allowing anyone anywhere, at any time, to stay current with developments in construction research in these areas.

Versions of the BSI 2006 and 2007 seminars are now available for a nominal fee at **http://irc.nrc-cnrc.gc.ca/webcasts_e.html**. The price of each online seminar is $125.

A Webcast of BSI 2008/09 will also be made available in the spring of 2009.

Joint project with ASHRAE investigates design methods for smoke management systems in atriums

A recently completed joint research project set out to address concerns that present design methods for atrium smoke management systems were overly conservative—and hence uneconomical—for the high atriums often found in North American buildings. The project investigated existing design equations, looking specifically at the scenario in which there is a fire in a room opening into an atrium, under a balcony (balcony spill plume scenario). In this case, the smoke exits from the room through a doorway and flows under the balcony and subsequently forms a plume in the atrium.

One approach to smoke management for atriums, or other large-volume spaces such as arenas and malls, involves using a mechanical exhaust system with fans to remove the smoke from the atrium. Such a system maintains the base of the smoke layer above the highest evacuation route from the atrium and above the highest opening between the atrium and adjacent areas of the building. However, using fans that are larger than necessary is not economical, while using fans that are too small results in failure to maintain the smoke layer above evacuation routes.

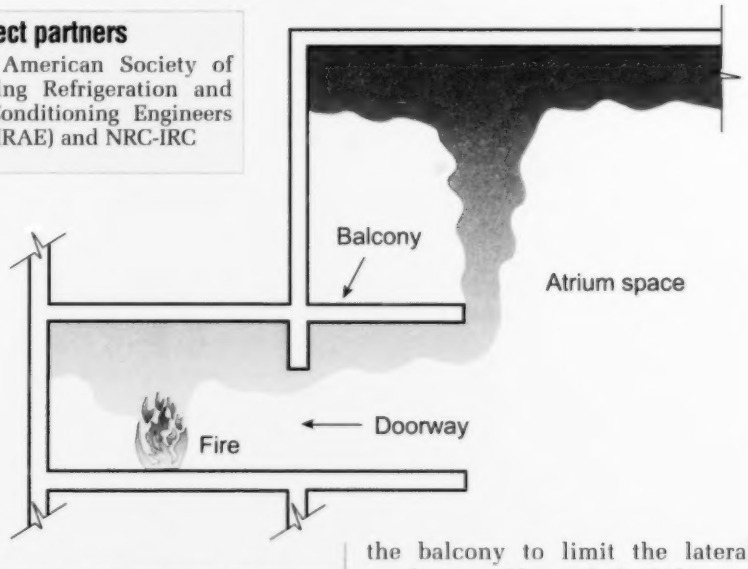
NFPA 92B Standard for Smoke Management Systems in Malls, Atria and Large Spaces published by the National Fire Protection Association provides requirements for designing and implementing smoke management systems in atriums.

NFPA 92B Standard

requires two fire scenarios to be considered in the design of the atrium smoke management system: 1) a fire on the floor of the atrium and 2) the balcony spill plume scenario.

Project partners

The American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) and NRC-IRC



Spill plume from a fire in a room opening into an atrium

Using the engineering equations provided in the NFPA standard, the smoke-production rate for each fire scenario can be estimated. This rate is then used to determine the fan capacity required for the smoke management system.

Current design methods for estimating the smoke-production rate for balcony spill plumes were developed based on 1/10 scale model testing for shops linked to malls or atriums. This research was conducted at the Building Research Establishment (BRE) in the U.K. The recent research conducted by NRC-IRC included experiments using a full-scale version of the test set-up used for the BRE scale-model tests. Some of the parameters that were varied in the tests included:

- doorway width (5 to 14 m)
- doorway height (3.6 and 5 m)
- fire size (500 kW to 5000 kW)

In addition, experiments were conducted with and without channelling curtains mounted beneath the balcony to limit the lateral smoke spread beneath the balcony.

The NRC-IRC researchers also carried out CFD (computational fluid dynamic) modelling studies to investigate the air entrainment into the smoke plume under and at the edge of the balcony and in high atriums. These studies provided further information for the development of new design equations for high atriums.

The research determined that the existing design equations in the NFPA standard are valid for scenarios in which the base of the smoke layer is less than 15 m above the height of the balcony, but for greater smoke-layer heights, the equations are conservative; hence alternative design equations have been proposed. These equations are currently being considered for the next edition of the NFPA 92B standard.

The final report for the project can be obtained from ASHRAE at http://www.ashrae.org/publications/page/1305. Specific questions can be directed to Dr. Gary Lougheed at (613) 993-3762, fax (613) 954-0483, or e-mail gary.lougheed@nrc-cnrc.gc.ca.

Recent experiments conducted in NRC-IRC moisture management facility

The Ventilation and Walls Research House with three identical side-by-side wall specimens

Water staining of the bottom plate of the stud cavity became apparent at the conclusion of the experiment.

Moisture accumulation in exterior walls can lead to permanent damage to their elements—a potentially costly problem to fix. In response, industry is continually innovating with new moisture control products such as air and vapour control coatings and membranes. To complement computer simulation techniques used to evaluate the performance of such products, the Field Exposure of Walls Facility (FEWF) located in the Ventilation and Walls Research House (see *Construction Innovation* December 2006) was recently commissioned.

The objectives of the commissioning study were two-fold: to better understand how to create and control conditions that lead to condensation within the wall, and to demonstrate the repeatability of results in the test facility through the testing of three identical side-by-side specimens.

The three test specimens were built on the west wall using construction methods typical of central Canada: PVC lap siding, polymeric sheathing membrane, exterior sheathing, 2x6 stud framing, glass fibre batts, polyethylene air/vapour barrier and painted drywall. The test specimens (shown in the top right photo) were fully instrumented to monitor heat, air and moisture flows at every layer of the assemblies. Two of the three test specimens were exposed to varying sets of conditions of indoor relative humidity (up to 70% RH) and air pressure (up to 5Pa of room pressure). An air leakage path was introduced into all three of the test specimens partway through the winter experiments.

Researchers made the following observations from the field monitoring that took place from January to April 2007:

1. No condensation was detected in the stud cavity or the exterior sheathing when a perfectly airtight polyethylene air/vapour barrier was in place, even when the indoor relative humidity (RH) was as high as 70%.
2. When the specimens were subjected to higher interior pressures and relative humidities, and the integrity of the polyethylene was compromised by an air leakage path, the test specimens responded to the indoor and prevailing outdoor climatic conditions:
   - Water condensate was detected on the exterior sheathing and on the bottom plate of the stud cavity. This occurred even when the indoor RH was as low as 30%, confirming that when the specimens were subjected to the varying sets of interior conditions (up to 70% RH and 5Pa of room pressure) this resulted in unwanted moisture accumulation in the stud cavity.
   - During events of strong westerly winds, the test specimens were exposed to cold air infiltration (through the air leakage path in place), which resulted in some drying of the stud cavity.
3. The two test specimens exposed to the same varying indoor conditions responded similarly to each other. This demonstrated that side-by-side comparisons of the test specimens in the FEWF could be conducted with confidence irrespective of their location within the test bay.
4. In May 2007, researchers opened the specimens and observed the presence of water stains on the bottom plate of the stud cavity (see photo above left). No permanent deterioration was apparent—the wetting had occurred over short enough periods to avoid the onset of observable deterioration.

The study showed that the new facility responds in a consistent fashion to discontinuities in the air barrier system—including localized condensation—when the indoor space is pressurized. It also demonstrated that the specific features of this facility make it suitable for moisture management experiments involving innovative materials and envelope systems.

Information on FEWF activities and results can be found at http://irc.nrc-cnrc.gc.ca/bes/hmpe/fieldfewf/index_e.html. For more information on current studies and to discuss future collaboration and partnering opportunities, please contact Dr. Wahid Maref at 613-993-5709, fax 613-998-6802, or e-mail wahid.maref@nrc-cnrc.gc.ca.

Building Science Insight 2008/09

NRC · CNRC

http://bsi.gc.ca

Organized by: National Research Council Canada
Institute for Research in Construction

Single and multi-family houses: improving performance through a systems approach

Building Science Insight is a national seminar series presented by the National Research Council Canada Institute for Research in Construction to provide construction professionals with practical information. Each seminar focuses on technical advances related to a specific topic and includes the results of recent NRC-IRC research.

This year's seminar "Single and multi-family houses: improving performance through a systems approach" will address a number of different issues:

Performing Basement Systems: Part 1: Managing the Water
Proper site grading and foundation drainage are required in order to prevent water damage to basements and their contents. NRC-IRC researchers will review current construction practices for basements, examine why problems occur, and provide practical suggestions for improving drainage and construction.

This topic will not be presented in Yellowknife, Whitehorse or Iqaluit.

Performing Basement Systems: Part 2: Managing Heat and Moisture
The basement envelope is subjected to highly variable water and moisture loads. This talk will look at emerging techniques and recommended approaches for managing moisture in wall assemblies for basements with living space.

This topic will not be presented in Yellowknife, Whitehorse or Iqaluit.

Building Envelopes for Canada's Arctic Regions
NRC-IRC has undertaken a study to develop exterior wall systems that will perform effectively under the extreme conditions prevailing in the coldest and most remote parts of Canada. This presentation will report on the study's progress and discuss the next steps.

This topic will be presented only in Yellowknife, Whitehorse and Iqaluit.

Sound Isolation in Wood-Frame Construction
Occupant satisfaction with the sound isolation between units is determined by the complex interaction of the separating wall or floor and all the building elements connected to those assemblies. This session will show designers how to choose elements that prevent significant structure-borne sound transmission from by-passing the separating wall.

Fire Stops and Fire Blocks
In order to ensure good performance of complete building systems, designers and builders must use a systems approach that meshes the requirements for both sound and fire control. This presentation will address fire stops and fire blocks in the context of Canadian codes and standards, illustrate possible designs for fire stops at junctions and penetrations, and provide guidance on corresponding acoustical issues.

Infiltration, Ventilation and Indoor Air Quality in Canadian Residences
Infiltration and ventilation have a critical influence on indoor air quality and thermal comfort. This session will present an overview of the causes and effects of infiltration. It will then examine mechanisms to manage humidity efficiently and examine the effect of construction materials on indoor air quality. The presentation will conclude with a discussion of the possibilities presented by existing and emerging simulation technologies for improved design.

Canadian Centre for Housing Technology (CCHT)
More than 30 different housing technologies ranging from fluorescent light bulbs and windows to natural gas-fired engines and a fuel cell have been assessed at CCHT's twin research houses. This presentation outlines the main features of the CCHT facilities and presents a brief overview of recent experiments conducted there.

CCHT Case Study Glazing Pt. I. Field Trial
In this presentation researchers will describe a series of experiments conducted at CCHT to examine the impact of low and high solar gain window glazings on energy consumption, room temperatures, window-surface temperatures, and the transmission of solar radiation.

CCHT Case Study Glazing Pt. II. Application and Practical Considerations
This presentation describes how the results from the field trial were used to predict energy performance of the two glazing systems for different locations across Canada. Practical considerations for the selection of glazing are also discussed. These include: house operation, energy costs and the use of shading strategies.

Speakers
The roster of speakers includes NRC-IRC building science specialists J. David Quirt, Iain A. MacDonald, Marianne M. Armstrong, Hakim Elmahdy, Michael C. Swinton, Trevor R. Nightingale, Wahid Maref, James T. Reardon, Boualem Ouazia and building science generalist Luc Saint-Martin.

Registrants will receive copies of NRC-IRC's recent publications *Guide for Sound Insulation in Wood Frame Construction*, the *Best Practice Guide for Fire Stops and Fire Blocks and Their Impact on Sound Transmission*, and *Performance Guidelines for Basement Envelope Systems and Materials*.

This one-day seminar will be held in the following locations:

English Seminars

- ***Yellowknife, Oct. 1, 2008***
- ***Edmonton, Oct. 3, 2008***
- ***Vancouver, Oct. 6, 2008***
- ***Whitehorse, Oct. 8, 2008***
- ***Toronto, Nov. 4, 2008***
- ***Iqaluit, Nov. 6, 2008***
- ***Winnipeg, Nov. 17, 2008***
- ***Calgary, Nov. 19, 2008***
- ***Saskatoon, Nov. 21, 2008***
- ***St. John's, Dec. 2, 2008***
- ***Halifax, Dec. 4, 2008***
- ***Moncton, Jan. 13, 2009****
- ***Ottawa, Jan. 15, 2009****

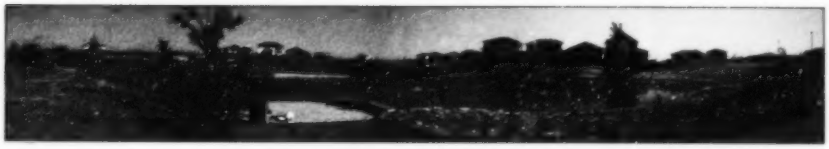
French Seminars

- ***Quebec, Feb. 3, 2009***
- ***Montreal, Feb. 5, 2009****

*** With simultaneous translation***

The registration for the seminar is $349 plus tax. Please visit the Web site at http://bsi.gc.ca for more details and registration information.

Urban stormwater runoff—waste product or resource?



One of the retention ponds monitored in the study

Collaborators on this project include the University of Regina and the City of Regina

At the National Research Council Centre for Sustainable Infrastructure Research (NRC-CSIR) in Regina, a research program is underway to examine possible technologies to reclaim stormwater runoff. Results from this research will be used to help Canadian municipalities decide on the appropriate treatment technologies to be used, given the water quality of their stormwater and the desired applications.

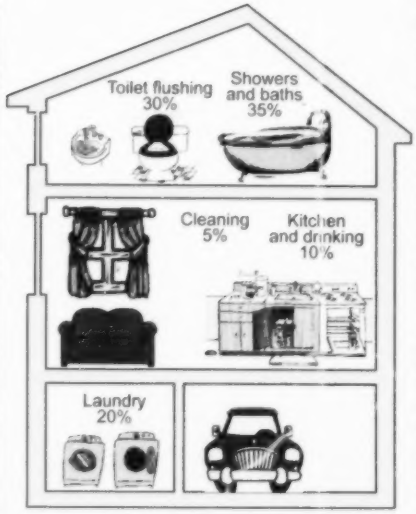
Traditional designs of Canadian urban stormwater drainage systems have focused on the rapid removal of runoff water to minimize the risks associated with flooding in urban areas. Essentially, stormwater runoff is treated as a waste product to be disposed of in the most efficient manner, which usually means discharging it into the nearest body of water. Over the past few decades technologies and practices have been developed to minimize the negative effects of urban stormwater on receiving water bodies, but the philosophy is still one of excess water management, with the ultimate goal of getting rid of the runoff water.

Canadian municipalities supply potable water, i.e., water that is fit for human ingestion, to their residents. However, many applications such as irrigation, toilet flushing and laundry do not require this level of water quality. These sub-potable applications can make up a high percentage of the total water used by city residents and businesses.

In many parts of the world, where water demand can exceed water supply, urban centres have come to recognize that stormwater runoff can be a source of sub-potable water and have adopted a philosophy of Integrated Urban Stormwater Management (IUSM) to retain and harvest the runoff water.

In Canadian cities, however, the reclamation of urban stormwater runoff is very limited, largely because the relatively cheap user-cost of potable water makes the cost of implementing IUSM non-competitive. But population growth, the costs of infrastructure installation and renewal, and climate change may soon make IUSM a competitive option for some Canadian cities.

To gain a better understanding of appropriate technologies for the Canadian context, the first phase of the NRC-CSIR research program is focused on the continuous monitoring of water quality in two stormwater retention ponds in the City of Regina for the summer months (started in June 2007). This data will be used to determine when stormwater should be extracted from the ponds (or from other locations in the drainage system) and what treatment, if any, is needed to make the water usable for various sub-potable applications. The next phase of the program will evaluate different treatment technologies.



Residential water use in Canada
Source: Environment Canada

If you are interested in participating in this research program, please contact Dr. Darryl Dormuth at 306-780-5510, fax 306-780-3421, or e-mail darryl.dormuth@nrc-cnrc.gc.ca.

Information on other projects related to the sustainable management of urban stormwater drainage can be found at http://irc.nrc-cnrc.gc.ca/csir/projects/drainage_e.html.

CORRECTION

The first sentence of the article "Major initiative to assess Canada's core public infrastructure" that appeared in the June 2008 issue of *Construction Innovation* should read as follows:

Infrastructure Canada has signed agreements with NRC-IRC and Engineers Canada, representing members of the National Round Table on Sustainable Infrastructure (NRTSI), to undertake a collaborative research project to assess the state, performance and management of Canada's core public infrastructure.

NRC-IRC launches initiative to improve air quality

Continued from cover page

technologies will be simulated and tested in a new indoor air research facility, which is currently being commissioned on the NRC campus in Ottawa.

The indoor air research facility will also be used, in conjunction with existing capabilities at NRC-IRC, to develop performance evaluation protocols to test and assess the effectiveness of technologies aimed at improving air quality. The project will generate reliable information that builders, building operators and homeowners can use to select technologies such as residential HRV (heat recovery ventilation) systems, single-room particle filtration units and commercial HVAC-mounted air modification systems. This is a significant part of the initiative because it will provide the foundation for a system that could eventually be used to label and rate the various technologies.

The NRC-IRC Indoor Air Initiative will also tackle the difficult task of sifting through available and newly generated information to identify knowledge gaps, recommend studies and disseminate information. This will be achieved through the creation of an independent national committee on indoor air quality as it relates to the design and operation of buildings and building systems.

The committee is expected to include broad representation from major stakeholders—governments, industry and consumers—to discuss issues related to indoor air and provide reliable and unbiased information on solutions and technologies that affect indoor air quality in buildings, based on the best available collective knowledge.

The Indoor Air Initiative currently has a three-year horizon to put a framework in place that NRC-IRC can build upon to further improve knowledge and, in the long term, contribute to the health of Canadians. To keep abreast of developments in this initiative, go to http://irc.nrc-cnrc.gc.ca/ie/iaq/initiative_e.html.

The facility's air handling system

Indoor air research facility

The most significant feature of the new indoor air research facility is the built-in flexibility to configure various floor layouts to simulate different types and sizes of buildings, such as the houses that will be part of the field study.

Several types of heating systems, air-conditioning systems, and heat recovery ventilators have been incorporated to realistically simulate the different situations encountered in the field. All systems are designed to allow a large range of ventilation and airflow conditions inside the house. As well, in order to replicate conditions in the field as closely as possible, the air tightness of the building can be modified.

With state-of-the-art equipment, such as particle image velocimetry (PIV), researchers will be able to visualize the airflow within a room and measure the level of comfort and air quality in all parts of the facility under different weather conditions. It will also be possible to measure the movement of different contaminants throughout the house using tracer gases.

Indoor air quality

What we put in a building and what we do there degrade the air within the enclosed space. For instance, most furniture, fabrics (including clothing), paints, glues, and cleaning products emit chemicals that are released into the air. Occupants also contribute to pollution through respiration and perspiration (producing CO_2 and odours from bacteria) and by conducting activities such as cooking, photocopying and printing.

Whereas controlling contamination sources is often the best way to improve IAQ, in many cases improving ventilation is a key IAQ strategy. In order to reduce the concentration of pollutants, ventilation is used to replace the "polluted" inside air with "fresh" outside air. The greater the amount of pollutants removed and replaced with outside air the greater the improvement in indoor air quality. Although the air outside may be polluted as well, it is assumed to be better than the air inside where, with insufficient ventilation, the concentration of pollutants could increase, creating unhealthy conditions.

In addition to ventilation, some buildings and homes use devices that claim to improve air quality, but little is known about the extent to which these technologies actually improve the air and could positively affect the health of occupants.

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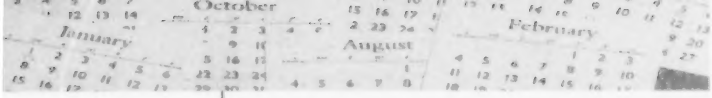

Upcoming events

OCTOBER

5-8

Acoustics Week in Canada, the Canadian Acoustical Association Annual Conference. Vancouver. http://www.caa-aca.ca/old_site/conferences/Vancouver2008/index_e.html

13-17

Moving Forward, Looking Back: the 40th Anniversary Conference of the Association for Preservation Technology (APT). Montreal. To be held in conjunction with a workshop on Conservation of Building Envelopes in Cold Climates, October 17-18. http://www.apti.org/conferences/2008/

NOVEMBER

2-6

American Concrete Institute Fall Convention. St. Louis, MO. http://www.concrete.org/EVENTS/EV_CONVENTIONS.HTM

4-5

Construct Calgary + HomeBuilder and Renovator Expo. Calgary. http://www.constructcalgary.com/*

5

Expo-Contech. Montreal. http://www.contech.qc.ca/eng/index_batiment.php*

19

Expo-Contech. Quebec, QC. http://www.contech.qc.ca/eng/index_batiment.php*

DECEMBER

3-5

Construct Canada. Toronto. http://www.constructcanada.com/index2008.htm*

3-5

Homebuilder & Renovator Expo. Toronto. http://www.homebuilderexpo.ca/

2009 JANUARY

26-28

International Air-Conditioning, Heating, Refrigerating Exposition (AHR Expo). Chicago. http://www.ahrexpo.com/

29-30

EnerHouse 2009. Halifax www.nshba.ns.ca

FEBRUARY

11-12

BC Construction Show. Vancouver. http://www.bcconstruct.com/*

27-March 1

Canadian Home Builders' Association National Conference. Quebec, QC. http://www.chba.ca/conference/index.php

APRIL

30-May 1

Symposium on Building Envelope Sustainability. Washington, DC. http://www.rci-online.org/Anno-RCIF-09Symp.html

19-20

Second Symposium on Heat-Air-Moisture Transport: Measurements and Implications in Buildings. Vancouver. http://www.astm.org/SYMPOSIA/

2010 JUNE

27-30

ICBEST 2010–International Conference on Building Envelope Systems and Technology. Vancouver. http://www.icbest.ca/

You are invited to visit our booth for more information about our research expertise.

This calendar does not include all events scheduled to take place during this time frame. For a more complete listing, see the Web version of "Upcoming events" at http://irc.nrc-cnrc.gc.ca/events_e.html

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Construction Innovation is published quarterly by the NRC Institute for Research in Construction.

Editor: Jane Swartz

National Research Council Canada
Institute for Research in Construction
Ottawa, Ontario K1A 0R6

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ISSN 1203-2743

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